SUMMARY

In the article the authors consider the advantages and disadvantages of different approaches to the assessment of innovative development of the enterprise. A system of indicators for assessing innovation activity is proposed, which will predict the cost of resources of the enterprise at all stages of its life cycle.

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THEORETICAL ASPECTS OF TECHNOLOGY TRANSFER RESEARCH FOR THE INNOVATIVE DEVELOPMENT OF THE NATIONAL ECONOMY

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ABSTRACT

Purpose– the main purpose of the paper is to identify qualitative relationships between innovation and technology transfer. The review of innovation, technology and technology transfer definitions and researcher's discussion were used to formulate the research question: What is the relationship between innovation and technology transfer?

Methodology – The authors discussed the process of creating an innovative economy through technology transfer. The opinions of various foreign scientists on the concept of technology transfer were studied. The systematic search of scientific literature was performed to collect the existing review paper on innovation and technology transfer. We also widely used such methods of theoretical research as analysis and synthesis, classifications, methods of comparative research.

Originality/value – importance of work theoretical aspects of technology transfer considered was the relationship between innovation and technology transfer.

Findings – it was determined that the essence of innovation is needed to maximize the socio-economic effect thus increasing the efficiency of the use of intellectual potential. The authors proposed ways to improve the innovative development of technology transfer and innovation infrastructure.

Key words: technology transfer, technological innovation, innovation process, patent applications, intellectual property

INTRODUCTION

The current desire and goals of most governments are to be progressive. Special attention is given to science, innovations and the opening of new specialties. Development in the innovative direction promotes inclusion of developing countries to the level of developed states. Great value is given to innovating, but not much attention is given to the processes. Technology transfer holds a very specific and important place among these processes.

Before considering the term "technology transfer", it is necessary to understand what is meant by technology. Eckhardt and Shane (2011) described technology in a broader sense as the special tool which can be used for the achievement of a specific goal, especially the optimal use of resources [1]. For example, the concept of technology is connected with other acts, as stated in the document "Recommendation on Science and Scientific Researchers" presented at the UNESCO meeting which took place in Paris from the 30th of October to the 14th of November 2017, at its 39th session. The document presents the idea that the word "technology" means any knowledge that is related directly to the production or improvement of goods or services [2]. Article 5, of the Convention of the UN in 1982, states that technology is considered to be the specialized equipment, the technical know-how, including references, drawings, and maintenance instructions, installation of the vital systems, including the maintenance and use of technical and consulting services.

The term in the English language means "a transfer from to" or "move to", it is used in tourism, banking, innovation, economics, sports, psychology and other subjects. Some use the word transfer, and others the word transfert. For example the French speaking world uses the word transfer, with the letter "t" on the end (transfert). The English-speaking world uses the word transfer, without the letter "t" on the end (transfer). In order to understand these two words (transfer and technology), they mean the movement of technologies. According to the Council for scientific and industrial research, the transfer of technologies is a process of providing new knowledge and innovative processes developed by third parties, making them available to the market and the public while also realizing commercial benefits and public benefits. According to Gee (1981), technology transfer is the process by which technology developed for one purpose is employed either in a different application or by a new user [3]. Kayak (1985) has defined technology transfer as the transition of know-how to suit local conditions, with effective absorption and diffusion both within a country and from one country to another [4]. According to another definition, technology transfer is "the utilization of an existing technique in an instance where it has not previously been used"[5], Derakhshani (1983) defines technology transfer as the "acquisition, development, and utilization of technological knowledge by a country other than that in which this knowledge originated"[6]. This definition is similar to that presented by Van Gigch (1978) [7]. He believes that technology transfer involves the acquisition of "inventive activity" by secondary users. It shows that technology transfer may not always involve the transfer of machinery or physical equipment. Knowledge can also be transferred through training and education, which could include training on how to effectively manage technological processes and changes [8].

Today in Kazakhstan attempts are being made to transition to innovative methods. Foreign experience is actively studied, and techniques for the development of new knowledge are adopted. Economic crisis, which is a current problem in the country, especially emphasizes the need to carry out high-level changes in all fields of activity.

It is necessary to emphasize that Kazakhstan — is a country that has very old methods of management. Often when carrying out the modernization of production and management which is extremely necessary for the formation of an innovative economy, these old management methods create barriers that interfere with the implementation of the desired outcome. The significant changes that are desired for the development of the economy of Kazakhstan are impossible without the participation of each component of the national innovative system. Development of the National innovative system of the Republic of Kazakhstan is aimed at the achievement of a sustainable development of the country. Diversification of the branches of the economy and exploring other sectors are needed, while at the same time innovations are defined as the major factor defining competitiveness of the national economy. Full use of innovations for further dynamic development of the economy and society are possible when carrying out a purposeful innovative policy by the state.

The president of Kazakhstan Nursultan Nazarbayev in his Message to the people of Kazakhstan (10 January 2018) gave attention to the most relevant problems of our state and society concerning the maintenance of sustainable development during "technological" and global changes. The president spoke about (The Fourth Industrial Revolution) being a mass introduction of technology concerning the production sphere. It covers different aspects of the life of people, including the labor market, the daily needs of the people, political systems,

and production technologies[9]. Additionally in order to be ranked among the top thirty developed countries of the world, priority must be given to the five main areas of development and the accelerated technological modernization of the economy and the development of new industries for use in digital technology. According to the President of the country of Kazakhstan it is not necessary to invent the wheel again if the developed countries of the world have already invented advanced machines and equipment. Therefore our time is limited thus it is necessary to save time. For this purpose many developing countries practice the transference of technology. The use of new technologies is the major factor influencing globalization of the country. At the same time these technologies quickly change, reducing life cycles of products and general processes while increasing technological expense. Thus, the transference of technology from the academic and scientific institutions have became strategic in bringing about change for companies and countries for the solution of the problems in the world economy. The role of technology transfer in the world economy has become one of the key questions facing the future of developing nations. The effective transfer of technology allows us to develop cooperation between the state and private sectors, to strengthen relations between science and the industry and to come into contacts with other nations.

MATERIALS AND METHODS

The analysis of technological transfer was carried out by using scientific methods and the study of scientific research. Sources that were used and incorporated in this research came from journals on "Innovation and Management", Scopus Indexed Journals, Springer publishing issues and others. The empirical data was collected from official statistics established by international organizations and analytical reviewers. Research took place in this order:

1) review of references;
2) scientific theories and studying methodology;
3) collecting statistical data;
4) analysis of data;
5) review of key recommendations written by foreign and Kazakhstan economists and practitioners
6) the carrying out of content analysis;
7) Remaining questions for research.

The relevance and need for the development of technology transfer were investigated at the first stage of the study. Then the stages of development of technology transfer in Kazakhstan were determined on the basis of secondary sources of information. We used the methods of theoretical and empirical research. We also widely used such methods of theoretical research as analysis and synthesis, classifications, methods of comparative research.

LITERATURE REVIEW

The transfer of technology - is not a new field of study. It began in the USA in 1940, and examples of technology transfer can be found before the emergence of technology began. Formal researches on technology transfer began with the research of technology conducted by European sociologists and quickly won recognition in a number of disciplines as important areas of research [10]. This line of research concerning technology transfer began in the United States in 1920 and quickly grew by the end of the 1970's. [11]. After a lull of nearly ten years the research of technology transfer again became the center of research in the field of sociology, economics, technology and education. It is estimated that, literature on technology transfer exceeds 10,000+ documents now [12]. In the mid 1980s, technology educators began to address the importance of technology transfer [13], yet little progress was made in expanding the curriculum to emphasize the links between technology development, transfer, and utilization. The significant contribution to a research of sustainable development, the principles and problems of technology transfer was brought by the following authors: scientists of foreign countries: Schumpeter J., Rogers, E. M., Backer, T. E., David, S. L., Soucy, G., Markert , L. R., Tenkasi , R. V., Scott D. J., Elizabeth F. G., Don H.,Mohrman, S. A., Bessant J.,Howard R.,

Hee J. Ch., James A., Matthias M., Chris Y., Pererva P.G., Kocziszky G., Szakály D., SomosiVeres M., John H., Barton G. E.,Barry B., Lindqvist S., Reisman A.

In Kazakhstan, the concept of technology transfer is relatively new. Therefore, there are very few domestic scientists in this study: Kenzheguzin M., Dnishev F., Alzhanova F., Smirnova Y.V.,Temirbekova Zh.A.

In the world and domestic practice, the content of technology transfer is considered in two directions: 1) at the macro level; 2) at the micro level. In the first case technology transfer is identified with the international exchange of technology, and the second is considered as the transfer process of technologies from science to production in research institutes, research laboratories, universities, enterprises and other organizations [14].

RESULTS AND DISCUSSION

From the point of view of many scientists, the concept of innovations and transfer are considered separately. This question concerns two cross-disciplinary areas of a research; (1) technology transfer and (2) distribution of innovations [15]. While technology transfer typically "refers to the development of a technology in one setting which is then transferred for use in another setting" [16], diffusion is used to describe the "spreading" or use of a technology within a society, organization, or group of individuals [10]. Thus, technology transfer is a wide concept which is not limited to the process of transferring information. Therefore technology transfer has to be classified by the following criteria: 1) the process of distributing scientific and technical knowledge; 2) the practical use of the scientific knowledge gained from other organizations; 3) the transition from fundamental knowledge to technical means; 4) the adaptation of the existing equipment to new use. At the beginning of the 21st century the American economist Schumpeter for the first time formulated that the competitive development of innovations as being the main condition for the development of a society. At the same time "the linear model" of Schumpeter in brief was as follows:

1. That the inventive, innovative activity is inherently based on economics, and businessmen only monitor the initial opening and creating of inventions and other technological innovations, for their profit;

2. Economic development takes place through technological innovations, and the efforts of businessmen create the emergence of new products and processes;

3. The innovative process — linear, begins with an invention and comes to fruition with the innovation making a profit [17].

Schumpeter considered innovation as a change in technology and management as a new combination of the use of resources, while at the same time he emphasized the role of the businessman in the innovative process. According to his views the businessman is the link between an invention and an innovation.

Comparing his work "The theory of economic development" to later books, researchers of the views of Schumpeter note that its central theme is the businessman, he is considered as the main link of the innovative process. The invention in itself does not carry much weight, it is necessary to find a commercial application for this invention.

The spreading of innovation is best understood as being associated with the concepts of “innovation”, “technology transfer” and “technology commercialization[18].

Thus, technology transfer is a channel for the dissemination of innovation and communication, it is in the context of technology transfer that the spreading of innovation and communication channels should be considered.

Samli (1985) believes technology transfer is the transmission of know-how to suit local conditions, effective absorption, and diffusion both within a country and from one country to another. As such, technology is not just one source of growth and vitality for individual enterprises and entire nations, but the central source in many cases [19]. Fransman (1986) defines international technology transfer as a process "whereby knowledge relating to the transformation of inputs into outputs is acquired by entities within a country (for example, firms, research institutes, etc.) from sources outside that country"[20]. Chesnais (1986) defines technology transfer as the transition of the capability to manufacture a product or process from firms in one country to firms in another [21]. He argues that this transfer includes not only the technical knowledge needed to produce the products,

but also of the capacity to master, develop, and later produce autonomously the technology underlying these products. Larsen et. al. (1986) define technology transfer as the process by which technological innovations are exchanged between individuals and organizations who are involved in research and development on one hand, and in putting technological innovations into use on the other hand [22]. Agrawal (1990)on the other hand, views technology transfer as the communication, adaptation and use of technology from one place or economic region into a second region [23]. He also adds that this technology has to be adapted to local conditions by the receiver to fit to its social, political, cultural, economic, and educational environment. According to Meissner (1988), transfer technology is the act of sharing know-how by such devices as constancy, joint ventures, gifts, licenses, franchises, and patents [24].

Patent statistics are a key indicator of innovative potential and one of the key indicators of technological development in countries and regions. The comparative analysis of statistical data on patent activity in the countries and territories of the world are issued by World Intellectual Property Organization —a specialized institution of the United Nations concerning intellectual property.

Table 1 – World Patent Application Statics

units

№	Countries	Total applications in 2017	Total applications in 2016	Total applications in 2012
1	China	1,381,594	1,475,977	526, 412
2	USA	606,956	605, 571	503, 582
3	Japan	318,479	451, 320	342, 610
4	South Korea	204, 775	7 ,767	178 ,924
5	Germany	67, 712	14, 030	59, 444
6	Russia	36,883	11,112	41, 414
7	Kazakhstan	1,228	716	1, 732

Source: Annual reports of the World Intellectual Property Organization [14].

The countries that ranked in the top 3 in issuing patents are China, the USA and Japan. These three countries also were also the highest in the exportation of new technologies to other countries. According to the World Intellectual Property Organization, in 2017, under the Patent Cooperation Treaty (Patent Cooperation Treaty, PCT), 243,500,000 applications were filed, which is 4.5% more than in 2016.

According to the Republican State Enterprise "National Institute of Intellectual Property" (NIIP), during 2017 in Kazakhstan the number of applications received for industrial property objects increased by more than one and a half times and amounted to 11,463 patents. The negative trend for filing applications for patent documents for inventions in recent years stabilized in 2017 at (1,228). The activity of the total amount of applications submitted increased by 0.6% (Table 2).

Table 2 – Submission of applications for issuance of security documents for intellectual property

units

Applications	2013	2014	2015	2016	2017
Application for inventions submitted, total	2,036	2,012	1,503	1,221	1,228
Divided into two areas:					
National applicants	1,824	1,740	1,271	990	1,055
Foreign applicants	212	272	232	231	173
Applications for utility models submitted, total	208	203	530	716	833
Applications for industrial design submitted, total	361	300	217	239	203
Applications for new varieties submitted, total	79	152	70	50	97

Source: Annual reports of the National Institute of Intellectual Property [25].

According to the Deputy Justice Minister, Natalya Pan, Kazakhstan has become more active in patenting intellectual property. She says, the total number of received applications for the registration of intellectual property objects has increased by 2.5% compared with 2016. Thus, the number of filed applications for trademarks increased by 0.8%, for inventions - by 0.6%, for utility models - by 16.3%, for successful breeds of animals - by 94%, for appellations of origin - by 100 %" [26].

At the same time, she added that there was a decrease in the number of filed applications for industrial designs – by 15.1%. The number of applications filed in electronic form has significantly increased by 47.5%. "In general, the number of applications submitted for the reception of public services involving NIIP (National Institute of Intellectual Property) increased by 2.5%. Compared to 2016, the share of patents granted for utility models increased by 2.4%," The Deputy Minister also said that the number of applications for inventions submitted in accordance with the international procedure has increased by 52% and the Eurasian procedure by 101.8%. Due to the fact that registered intellectual property objects are being used more actively, the share of registered licensing agreements has increased by 9.7% and franchising agreements have also increased by 8.3%.

Studying the data of the annual reports of the National Institute of Intellectual Property, the UNESKO database and the MNT RK, we evaluated the effectiveness of the innovative infrastructure in Kazakstan.

Table 3 – Measurement of Innovation Infrastructure Effectiveness in Kazakhstan

per.

Indicators	2013	2014	2015	2016	2017
Expenditures on R&D, in % of GDP	0,17	0,17	0,17	0,14	0,13
Number of scientists and researchers, per 10, 000 employed	26,2	28,7	27,8	25,5	25,8
The level of activity of enterprises in the field of innovation for all types of innovation, in percent	8	8,1	8,1	9,3	9,6
Share of innovation output in GDP	1,61	1,46	0,92	0,95	1,59
Number patents filed, per mln. of population	87,4	87,4	87,4	56,42	47,86

Combined by the authors

Under this analysis, we can see the researchers and patents above the rest of the indicators. The main problem in this is not enough money allocated from GDP. Before considering the transfer of technology, you need to look back at the state of innovation in the country. It is impossible to analyze the transfer technology for only one indicator. As the transfer of technology is a complex process, it requires qualified specialists and favorable conditions. In developed countries, technology transfer is considered an organization that is located near the university. This technology transfer organization helps, connects the work of the enterprise and universities. The technology transfer organization (TTO) occupies a crucial place in the development of the country's innovation. Therefore, for Kazakhstan as a developing country, it is necessary to integrate the enterprise and universities, also the government support.

CONCLUSION

It is necessary to analyze the innovation processes. Individual study of each stage ensures the correct formation of the innovation infrastructure of the country. Despite the seeming simplicity and knowledge of the issues, to create a high-tech economy and social development, it is necessary not only to study issues, but also to engage in philological and scientific research in order to begin to study new innovations, their distribution and commercialization. In Kazakhstan, the technology transfer system needs special mechanisms for the

organization of the innovation processes that ensures the effective interaction of all its participants - the state, industrial enterprises, scientific and educational institutions, and financial institutions. In this case, foreign experience in organizing technology transfer is useful. A necessary condition for its effective use is the formation of an appropriate innovation infrastructure:

• a legislative framework focused on stimulating innovative entrepreneurship and guaranteeing the protection of intellectual property rights;

• specialized scientific and scientific-research/educational centers, scientific (innovative, technological) parks, centers for the transfer and commercialization of technologies, business incubators, innovative firms that contribute to the transformation of promising scientific ideas and the transformation of knowledge into a product, information and technological innovations;

• financing research and development from the business sector through the creation of legal and financial guarantees of soft loans, various extra budgetary and joint funds, state incentives and direct foreign investment;

• telecommunications infrastructure for the free access of information in the field of science in Kazakhstan, access of local information networks to global ones, increase of the network of electronic libraries and distribution of the Internet, expansion of the access for Kazakhstan scientists to international data banks;

• development of a network of venture capital firms and funds, small innovative firms and other elements of the innovation infrastructure.

Also in this direction, it is necessary to rely on the methodology of the system-synergetic approach in order to comprehensively understand the basic laws, processes, elements, phenomena and their interrelations in the innovation system. Then it is possible to fully solve the problem of forming a society of the future.

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ТҮЙІН

Мақалада авторлар технологияларды трансферлеу арқылы инновациялық бағыттағы экономиканы дамыту процесстерін қарастырады. Инновациялық қызметтің мәнін зияткерлік әлеуетті пайдалану тиімділігін арттыру арқылы әлеуметтік-экономикалық тиімділікті барынша арттыруға болатындығы анықталды. Сондай-ақ, инновациялық процестерді жетілдіру көзі ретінде технологиялар трансферін және инновациялық инфрақұрылымды жетілдіру жолдары ұсынылды.

РЕЗЮМЕ

В статье авторами были рассмотрены развитие инновационно-ориентированной экономики путем передачи технологий трансфера технологий. Определено, что суть инновационной деятельности заключается в максимизации получения социально-экономического эффекта за счет повышения эффективности использования интеллектуального потенциала. Также, авторами предложено пути улучшения инновационного развития передачи технологий и инновационной инфраструктуры в качестве источника.

SUMMARY

In the article, the authors examined the development of an innovation-oriented economy by transferring technology transfer technologies. It is determined that the essence of innovation is to maximize the socio-economic effect by increasing the efficiency of using intellectual potential. Also, the authors proposed ways to improve the innovative development of technology transfer and innovation infrastructure as a source.